

Designing Across Map Use Contexts

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Abstract: The explosion of map use in the past few decades as part of everyday activities, accelerated through the digital production and dissemination of maps and the availability of low-cost, location-aware devices, has made the job of cartographers and map display designers more challenging. Yet, how do these recent changes affect effective map design? Can we accurately predict which designs will work for a given context? We investigate the concepts of design transferability, context, and relevance, and their potential to help us create map design outcomes that are effective for varying map use situations. We then present a model for operationalizing map use context to support evaluating map design transferability and pose several open research questions that need to be answered to support operationalizing map use context. This is followed by a research agenda that identifies research opportunities related to key research needs that will underpin transferable map design.

Keywords: map use, transferable map design, context

1. Introduction

The explosion of map use in the past few decades as part of everyday activities, accelerated through the digital production and dissemination of maps and the

availability of low-cost, location-aware devices, has made the job of cartographers and map display designers more challenging. Yet, how do these recent changes affect effective map design? Can we accurately predict which designs will work for a given context; users, environments, activities? A problem with empirical map design experiments including map users is that they can only assess a limited number of factors, if internal (experimental) validity is important, yet many factors may ultimately influence map user performance if the experiment also aims to be ecologically valid. While understanding how and why a given factor affects performance is useful and even desirable, in a messy, dynamically changing world, making highly reliable and accurate design predictions often requires substantially more knowledge than we currently have about human map use. This may especially be the case when maps are used in contexts that differ substantially from those used in factorial experiments—typically conducted in a controlled laboratory full of undergraduate students; a strong argument for improving the ecological validity of empirical map use research. Moreover, even a complete model of map use will likely result in conflicting design requirements that cannot be resolved, but only traded-off by the designer.

2. Goals of the research

We investigate the concepts of design transferability and context and their potential to help us create map design outcomes for new map use situations. Transferability is an idea with its roots in qualitative research, in which researchers seek to understand the contexts to which the results of their research might be transferred, rather than generalized to an entire population. But what do we need to understand to be able to successfully transfer designs from one context to another? Do we need to describe all possible context information? Are some pieces of context information more important for understanding some map use situations than they are for others? In other words, how relevant are particular pieces of context information for a given map use situation?

We present a model for operationalizing map use context to support evaluating map design transferability. Judging the transferability of a design requires an understanding of the contextual circumstances that are relevant for a particular map use situation. Taking the view that context is an emergent, dynamic property of map use, we propose that distinct map use contexts emerge from individual map use situations. In this approach, map use is the situation, and context information emerges from the interaction of four components: the map user, the map use environment, the map itself, and the map use activity. Each model component is an essential part of a map use situation: the map (e.g., design, nature of data, display device), the activity (e.g., purpose for using the map, actions undertaken while using the map), the user (e.g., individual differences, capabilities, mental states), and

the environment (e.g., the setting of the map use). Importantly, this model is not conceived as a one-size-fits-all representation of map use, but as a tool to facilitate the comparison of map use situations and to support evaluation of design transferability.

Our presentation of a model for operationalizing map use context is followed by a research agenda that identifies research opportunities and challenges related to key research needs that will underpin transferable and adaptive map design.

3. Further work

This research agenda paper is one of five papers developed through a joint workshop at ICC 2015 by the ICA Commissions on Cognitive Issues in Geographic Information Visualization; Use, User and Usability Issues; Visual Analytics; and Map Design. The full paper is published in a 2017 issue of *The International Journal of Cartography*.

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